

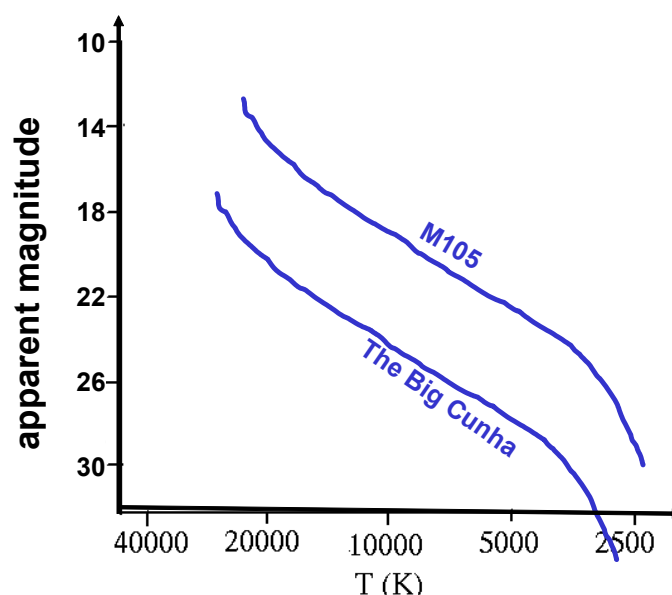
Natural Sciences 102 -- Spring 2005

Homework #6 May 10, 2005

Due in class May 17, 2005

1. The H-R Diagram as a distance indicator:

- Describe in words (you may use equations if you wish) how the H-R diagram can be used as a distance indicator.
- The distance to the open cluster M105 is known to be 1000 pc. Another cluster is discovered by Carlos Cunha, which he names the “The Big Cunha” cluster. Use the information from the H-R diagrams below to calculate the distance to The Big Cunha.



2. Hubble's Law: (Please show your work.)

The spectrum of the light from the galaxy Vallinotto has a line at 5500 Angstroms. The line is from the element Erwinium, and in the laboratory the wavelength is 5000 Angstroms.

- What is the apparent recessional velocity of Vallinotto.
- Using a Hubble constant of $H_0 = 50 \text{ km s}^{-1} \text{ Mpc}^{-1}$ and the fact that the velocity of light is $c = 3 \times 10^5 \text{ km s}^{-1}$, what is the distance to Vallinotto?

(over)

3. Doppler Shift:

- a) Define the Doppler shift and explain how it can be used to determine velocity.
- b) Andrew Hill is driving his new pickup truck through the streets of his hometown of Jockitch, Texas. Sheriff Catchem points his radar gun at Andrew's bright red pickup and determines that the radar beam of wavelength 10 meters he sent out bounced off the gunrack in his truck and returned to him with a wavelength of 10.000001 meters.
 1. Is Andrew approaching Sheriff Catchem or driving away from him?
 2. How fast is Andrew driving?

News of the week

- The class website is still <http://home.fnal.gov/~rocky/NS102/> .
- This week's laboratory will be "Geometry of the Universe."
- May's reading assignment is Kolb, Chapters 6-11.
- It would be a good idea to start Hawking.